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ABSTRACT

The design of instructional text is an important consideration when attempting to design a successful learning environment. With the rising involvement in online distance education, it is becoming even more important to adhere to good principles of text design. The purpose of this paper is to provide a framework of possible instructional systems design strategies and their associated tactics to use in an online environment based on research studies conducted on traditional paper-based materials. The paper argues that the focus on content, and particularly the focus on designing quality content should not be discouraged, but rather, it must be considered as a fundamental foundation for the development of other online components. The intellectual property of the faculty member, the content, the "text" as it is called in its fundamental sense, should serve as the basis by which communication, understanding, and interactions in an online distance education course are grounded. (Contains 55 references.) (Author/AEF)

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Instructional Systems & Distance Education: Understanding the Implications

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Abstract

The design of instructional text is an important consideration when attempting to design a successful learning environment. With the rising involvement in online distance education, it is becoming even more important to adhere to good principles of text design. The purpose of this paper is to provide a framework of possible instructional systems design strategies and their associated tactics to use in an online environment based on research studies conducted on traditional paper-based materials. We argue that the focus on content, and particularly the focus on designing quality content should not be discouraged, but rather, we must consider it as a fundamental foundation for the development of other online components. The intellectual property of the faculty member, the content, the "text" as it is called in its fundamental sense should serve as the basis by which we ground our communication, our understanding, and our interactions in an online distance education course.

Introduction

The design of instructional text plays an important role in the field of Instructional Systems. It is through text which we receive many of our day-to-day messages, including simple things such as menus and memos, to more complex texts such as textbooks and articles. The increasing number of distance education courses is creating a new text medium through which individuals can interact. Many of the information learner's process come through the medium of text. In order for text to be in existence, authors must put forth their words of communication into a form, such as a book, article, memo, and now on-line courses, and the learner must interact with it. It may appear simple but much is going on between the time the author puts their content on paper and the learner attends to it, interacts with it, and processes it. What is occurring relates to a learner's text processing strategies (Duchastel, 1982). The text should not merely be a message from the author, but rather the message should be encompassed in a textual design which promotes learning.

Duchastel (1982) identifies the processes of attention, comprehension, and retention as crucial to the textual processing of a message. The learner must first be able to pay attention to a piece of text and sustain interest. The learner must then be able to understand what the author is trying to convey, and for ultimate effectiveness in the communication of a message, the learner will retain what they have learned. If we agree that these processes are vital to the communication of a textual message, then we can begin to speculate about strategies and tactics that authors can utilize to enhance the likelihood that each of the above processes would occur.

Where the conundrum occurs is in the medium of on-line distance education courses. There has been an abundance of research studies addressing text design variables in more traditional paper-based materials, but few studies have investigated the use of design strategies and tactics in an on-line distance education environment. In fact, some researchers argue that the capacity for the new technology to enhance learning quality is failing on-line courses (Duchastel, 1997). The only analyses of online courses have produced results indicating authors are simply creating electronic versions of their traditional print-based materials (Dehoney & Reeves, 1998). This paper provides an alternative way of viewing this discouraging environment of course quality and use of design strategies. We argue that creating an on-line course must begin with a fundamental examination of the "text". Regardless of the type of interaction strategies, communication environments, or activities planned in an on-line course, the content (which can be referred to as the text or the intellectual property of the faculty member who authored it) provides the essential foundation from which the interaction, communication, and collaboration activities can occur. The purpose of this paper is to provide a framework of possible instructional systems design strategies and their associated tactics based on research studies conducted on traditional paper-based materials. It is not the purpose to provide an exhaustive review of all possible design tactics that can be utilized in an on-line environment, but rather to stimulate interest in formulating basic research in the design of content in on-line environments.

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In order to elicit optimal text processing as discussed by Duchastel (1982) above, he has grouped the various design tactics into three broad strategies: labeling, highlighting, and illustrating. Labeling strategies identify and summarize the facts, concepts, rules, principles, and procedures in the text. Highlighting strategies help the learner to focus on the material. The third strategy, illustrating, assist the learner with the functions of attention, comprehension, and retention. Each of these strategies and their associated tactics can help the author structure and organize content in such a way as to promote the acquisition, integration, comprehension, and application of the message being communicated. The next section will provide a sampling of possible tactics that can be utilized under each of the strategies identified by Duchastel (1982).

Instructional Strategies

This section will describe the three instructional strategies of labeling, highlighting, and illustrating. Within each of these strategies, specific tactics that would be most easily implemented in an on-line distance education medium will be identified. Although research in the area of instructional systems has primarily focused on the design of text-based materials, the increasing rise of on-line distance education courses provides an impetus for identifying which text-based variables could serve to enhance the quality of on-line materials. Once particular variables have been identified, research studies need to be conducted to determine the effectiveness and efficiency of these text-based variables in an on-line medium.

Labeling

The major design variables that can be utilized under the general category of labeling include headings, marginal notes, and embedded glossaries. The purpose of these tactics is to identify and summarize the content provided by the author. The content can be in the form of facts, concepts, rules, principles, and/or procedures. These tactics can serve to enhance learner attention, comprehension, and retention of the material at the lowest level of processing. These instructional tactics also tend to be fairly efficient. Labeling is often associated with the strategy of signaling which is defined as orienting the learner to the text through the use of various textual display tactics. The purpose of signaling/labeling is to help the learner identify the "structure, type, or function of content" (Jonassen & Kirschner, 1982, p. 124). Its purpose is to orient the learner to the text document and allow them to organize their attention and retrieval strategies to improve performance. In the following paragraphs, the use of headings, marginal notes, and embedded glossaries will be discussed.

Headings can be defined as a typographically and spatially distinct piece of text signifying the theme or content of the section following it. Headings have been shown to increase the general improvement of text memory (Lorch & Lorch, 1985). Even when a variety of different measures are used, such as cued recall summarization, or free recall, headings show improvement for memory (Dee-Lucas & DiVesta, 1980; Hartley & Trueman, 1985; Holley, Dansereau, Evans, Collins, Brooks, & Larson, 1981). Headings are a relatively efficient way to incorporate good instructional design in on-line courses.

The second labeling tactic, marginal notes, has received little research attention. Marginal notes are defined as a column alongside the content which both outlines the content and acts as a running summary. Duchastel and Chen (1980) also find marginal notes act as an "access structure" allowing the learner to identify the appropriate details from the overall text. Although they did not conduct an experimental student regarding marginal notes, Duchastel and Chen (1980) surveyed sixteen students and found that fifteen of them agreed that marginal notes were useful. Marginal notes, if used appropriately, can be an excellent addition to an on-line course. The only dilemma to is the necessity to avoid the use of frames in creating the marginal note column. Web sites using frames create extreme difficulties for individuals with disabilities who use screen readers.

The third labeling tactic is the use of an embedded glossary. Acting as a terminology marker, an embedded glossary is defined in this project as a tool which identifies difficult words and defines them. This tactic is fundamentally different from marginal notes, though, because it does not attempt to summarize any of the information learned up to a given point. It merely identifies a present word on the page and defines it so the learner is less involved in the terminology and more involved with the content. Although research has not investigated the effectiveness of embedded glossaries, the use of an embedded glossary is a relatively easy tactic to implement in an on-line course. The author of the course can simply identify difficult words in the text and hyperlink them to a page containing the definition.

Table 1 provides a brief overview of each of these tactics and additional ones, their purposes, and research literature that has examined them.

Table 1. Labeling Strategy Tactics

Tactic	Purpose	Research Literature
Headings	• Identify main points • Enhance organization • Increase retrieval • Provide structure	• Doctorow, Wittrock, & Marks, 1978 • Dee-Lucas & DiVesta, 1980 • Hartley, Kenely, Owen, & Trueman, 1980 • Holley, Dansereau, Evans, Collins, Brooks, & Larson, 1981 • Lorch & Lorch, 1985, 1996 • *Hartley & Trueman, 1985* • *Wilhite, 1989*
Marginal Notes	• Identify and summarize main points • Focus attention • Increase retrieval and provide structure	• Duchastel & Chen, 1980
Embedded Glossary	• Identify and define key concepts • Clarify text and enhance retrieval	• No literature found specifically addressing embedded glossaries
Chunking/ Spacing Text	• Enhance structure and organization • Assists with organization and retrieval	• Miller, 1956 • Frase & Schwartz, 1979 • Wilson, Pfister, & Fleury, 1981

Highlighting

The major design tactics that can be utilized under the instructional strategy of highlighting include typographical cues, objectives, summaries, questions and advanced organizers. The purpose of these techniques is to highlight for the learner important content. These techniques can also organize the content for the reader, which will enhance their attention, comprehension, and retention of the content at a deeper level of processing than is provided by the labeling instructional strategy. Highlighting is related to the strategy of controlling defined as the utilization of textual display tactics to initiate different mental processing capabilities. The purpose is not only to signal the text but also to control the attention of the learner, and purposefully identify information that is important and requires the learner's focus. In the following paragraphs, the use of typographical cues, advanced organizers, and objectives will be discussed.

Typographical cues are a very cost-efficient method of improving the structure of a text document. Particularly with the use of bolding or italicizing, one can increase the readability of the text and increase the likelihood that the learner will extract the main points. Typographical cues are defined as a highlighted text word or fragment in the body of the text which serves to draw a learner's attention to the content surrounding it. Typographical cues have been studied extensively, and many studies have found the use of them to improve memory for the text word or fragment it is highlighting (Cashen & Leicht, 1970; Glynn & Divesta, 1979). One unresolved matter in experimental studies on typographical cues is the effect on the content which is not highlighted. Some have found that memory for text which was not highlighted to be unaffected (Foster, 1979) while others found it to inhibit recall (Glynn & Divesta, 1979). The importance of distinguishing among facts, concepts, and rules/principles may play a role in this particular contradiction. A possible explanation is typographical cues may need to be used on specific types of information. For example, they may be more appropriate to use on facts. Further research can help to clarify inconsistent results. Although bolding, italic izing, underlining, all caps, and color can be used to create typographical cues, the most cost efficient in developing an on-line course would be the use of bolding or italicizing. Underlining and words in color can often be confused with hyperlinked items.

The second major highlighting tactic to be discussed here is the use of advanced organizers. Advanced organizers are defined as a brief verbal statement providing a mechanism for the learner encoding process. This brief verbal statement contains no reference to the content in the document, but rather sets up the organizational features of the document to aid the learner's processing. As seen with some of the other mentioned text variables above, advance organizers have conflicting findings. Ausubel (1960), the pioneer of advance organizers, found in all of his studies that those groups with advanced organizers recalled more than that of the control group. Hartley and Davies (1976) after summarizing the results of many studies on advanced organizers found that the use of them does improve learning. Particularly for an on-line course where the learner is at a distance from the instructor, it is important to provide a clear understanding for the learner regarding the types of strategies and tactics utilized throughout the document. For example, if the author of a course decides to utilize typographical cues to symbolize important concepts by bolding them, the student should be made aware that bolded words symbolize concepts they

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need to make sure they understand. Advance organizers may even be useful for stimulating motivation because they serve to increase confidence (Keller, 1987) in what the learner is likely to expect within the content.

Objectives are defined as statements of what the learner should know and be able to answer questions about in the upcoming sections. Objectives are another area of contradictory study. Some experimental studies have found that learning is improved by the use of objectives (Rothkopf & Kaplan, 1972), while other studies have found the opposite finding (Jenkins & Deno, 1971). One possible explanation for the inconsistency in research results could be that the objectives in each study may have been written using incomparable models. Most instructional designers use Mager's (1975) model for writing behavioral objectives. This model stipulates that objectives should include the actual skill or behavior that the learner should be able to perform upon completion of the instruction, conditions under which the learning should occur, and the criteria for successful performance. The use of objectives is a cost efficient and if used appropriate, effective strategy to utilize in an on-line course.

Table 2 provides a brief overview of each of these tactics and additional ones, their purposes, and research literature that has examined them.

Table 2. Highlighting Strategy Tactics

Tactic	Purpose	Research Literature
Typographic Cues	▪ Focus attention on material ▪ Facilitate learning and retrieval of main points ▪ Enhance structure and organization	▪ Cashen & Leicht, 1970 ▪ Fowler & Baker, 1974 ▪ Glynn & Divesta, 1979 ▪ Foster, 1979 ▪ Hartley, Kenely, Owen, & Trueman, 1980 ▪ Nist & Hogrebe, 1987
Advanced Organizers	▪ Focus attention on document ▪ Facilitate learning and retrieval of main points ▪ Enhance structure and organization ▪ Provide learner a content-oriented summary to help learner focus on important points as they read through document	▪ Ausubel, 1960, 1962, 1963, 1968, 1978 ▪ Ausubel & Fitzgerald, 1961, 1962 ▪ Barnes & Clawson, 1975 ▪ Hartley & Davies, 1976 ▪ Luiten, A mes, & Ackerson, 1976 ▪ Mayer, 1979 ▪ Hartley & Trueman, 1982 ▪ Lorch & Lorch, 1985, 1996
Objectives	▪ Focus attention on material ▪ Facilitate learning and retrieval of main points ▪ Enhance structure and organization	▪ Rothkopf & Kaplan, 1972 ▪ Duchastel & Merrill, 1973 ▪ Duell, 1974 ▪ Hartley & Davies, 1976 ▪ Davies, 1976 ▪ Duchastel, 1979
Summaries	▪ Enhance focus/comprehension of material	▪ Newsom & Gaite, 1971 ▪ Hartley & Burnhill, 1978 ▪ Hartley, Goldie, & Steen, 1979 ▪ Reder & Anderson, 1980
Questions	▪ Enhance deeper level of processing	▪ Rickards & Denner, 1978

Illustrating

The strategy of illustrating tends to incorporate the least cost-efficient tactics. Tactics such as graphics and diagrams tend to cost additional money to develop but can increase the level of processing of particular content. Table 3 provides a brief overview of the tactics of graphics and diagrams/flowcharts/tables, their purposes, as well as research literature that has examined them.

Table 3. Illustrating Strategy Tactics

Tactic	Purpose	Research Literature
Graphics	▪ Provide additional assistance in	▪ Dwyer, 1968, 1972

	processing content • Offer a visualization of textual description	• Hurt, 1987 • Levie, 1987 • Weidenmann, 1989
Diagrams/ Flowcharts/ Tables	• Offer a hierarchical or process orientation for content through visual representation	• Burnhill, Hartley, & Young, 1976 • Richards & Johnson, 1980 • Larkin & Simon, 1987

Conclusion

The framework of strategies and tactics provided offers a chance to reassess the way we view content in the online environment. Some authors believe that current and forward thinking should encourage a discouragement of the emphasis on content in the design process (Oliver, 1999) in favor of a focus on learning activities and learning supports. We argue that the focus on content, and particularly the focus on designing quality content should not be discouraged, but rather, we must consider it as a fundamental foundation for the development of other online components. The intellectual property of the faculty member, the content, the "text" as it is called in its fundamental sense should serve as the basis by which we ground our communication, our understanding, and our interactions in an online distance education course.

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